MCX/ICX INSTALLATION AND OPERATION MANUAL

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MCX/ICX INSTALLATION AND OPERATION MANUAL

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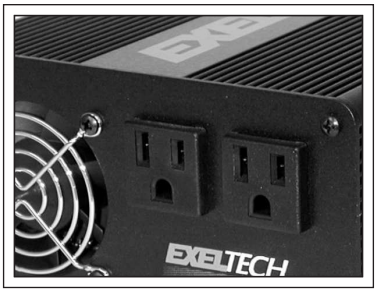


Introduction 1.0

Thank you for purchasing the finest sine-wave inverter in the power conversion industry. Exeltech's journey to excellence includes the first affordable sine wave inverter, first modular inverter system, first N+1 redundant inverter system, and the cleanest sine wave output in the industry. Exeltech strives to manufacture products of the highest possible quality, and is dedicated to 100% customer satisfaction. Proudly built in the USA with American parts, Exeltech is committed to TL 9000 standards and beyond, adding people and procedures continually to further improve quality and customer service. We welcome you as a customer to the Exeltech family. Congratulations!

As a stand alone inverter, the EXELTECH MCX/ICX meets all of the power and distortion specifications that have been proven by our XP Family of products. XP series inverters provide the cleanest, best regulated sine wave output over the widest DC input of any inverter on the market today. They are extremely low in Total Distortion; specified to 2%, and typically better than 1.5%. Total Harmonic Distortion is typically 0.8 to 0.9%. Remaining distortion is a result of residual switching noise, which amounts to a very clean 25 kHz sine wave superimposed on the fundamental output. No significant harmonics of 25 kHz exist. This spectral purity will exist over the inverter's entire operating envelope, including non-linear and reactive loads. As long as peak output current remains less than 200% of rated current for XP-2000 total harmonic distortion will remain within the 2% spec. Peak current capability of the inverter is key to understanding it's operational envelope. As long as the inverter is supplying less than this amount, it will function properly and operate virtually any load.

The EXELTECH MCX/ICX Inverter/Charger has 1000 Watts of rated DC power available to keep your batteries charged to their optimum level, when power to run your critical load is available from a primary source. However, when the primary source is interrupted, your EXELTECH MCX/ICX stands ready to deliver 2000 Watts of rated power, and 4000 Watts of surge power within 4mS. Then, once the primary source of power has been restored, the Inverter/Charger will sense it's presence, lock on to it's frequency, and seamlessly transfer your critical load back to its primary source.

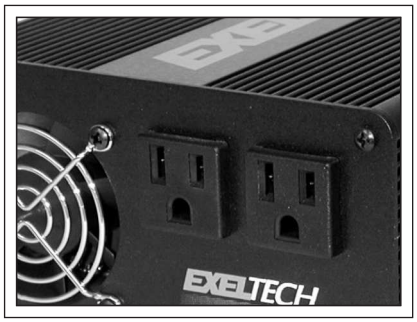
Many inverters are rated in Volt-Amps (VA), as opposed to Watts. This is in an attempt to make an inverter or UPS (Uninterruptible Power Supply) appear larger than it really is. The only fair way to specify these products is in watts (W), which is power the inverter can actually deliver. If Exeltech inverters were specified in VA, our 2000 watt inverter could be rated at 2500 VA @ 0.8 pf., 2857 VA @ 0.7 pf, or an incredible 4000 VA @ 0.5 pf. It is confusing to specify a product in VA, because the power factor must also be specified. Exeltech's inverters can output their full rated power continuously at 30° C (86° F)

The inverter will maintain a spectrally pure output with any load, due to a specially designed non-linear control loop in the primary DC to DC converter. This circuitry is one of three circuits which protect the inverter from any overload condition.

EXELTECH 2KW INVERTERS

These inverters can supply twice their rated output power for 3 seconds, in order to start motors or supply in-rush currents to electronic loads. If output power is exceeded for greater than 3 seconds, output voltage is reduced to a level which will provide the inverter's rated power to the load by clipping tops of the waveform. Should the overload condition clear, the inverter will again provide the cleanest Sine Wave in the industry. If the overload condition persists, requiring the user to cycle the power button to turn the inverter on again. The inverter will disable its output within 7 seconds. This over-current circuitry insures maximum current does not exceed 200% of rated RMS current for XP-2000. The third protection mechanism is short circuit. Similar to overload condition, the inverter will

supply it's peak current to the load for 3 seconds then it will scale back to it's rated current for an additional 4 seconds. If the short is not cleared within that 7 seconds the inverter will shut off requiring the user to cycle the power button to turn it back on. Exeltech's inverters can output their full rated power continuously at 30° C (86° F). The inverter is derated 20% of its full power for every 10° C over 30° C. IE; 80% of normal capacity at 40° C, 60% at 50° C . . . Etc.



Standard Features 2.0

In addition to the Standard features offered by the XP family of inverters, there are features specific to the charger and transfer switch functionality.

DC INPUTS: Positive (+) and Negative (-) input terminals are 5/6" studs with brass hardware. They are accessed under the rear cover. Use "Appendix A" to choose the appropriate gauge wire for your specific model.

REMOTE ON/OFF: Provides the user with a remote method to turn the inverter on and off. "REMOTE" connection is on the barrier terminal strip located under the rear cover.

AC OUTPUTS: All domestic models have two NEMA - 20A receptacles on the front plate and a barrier strip terminal on the backplane. They are tied to the inverter's output as well as the charger's input, which means that there will always be AC present on these outlets as well as the "LOAD" connections on the backplane. The AC will come from the primary source when present and from the inverter when the primary source is not present.

EXTERNAL THERMISTOR: Supplied with unit and a required part. It is able to sense the temperature of a battery when charging. The “Float Voltage” will be automatically adjusted in order to avoid over-charging a hot battery.

BAD BATTERY PROTECTION: Will shut down the charging function of the MCX/ICX if there is to much resistance between the positive and negative battery connection indicating that the battery is bad or that there is a bad connection.

COOLING: Provided by a thermostatically controlled brushless fan located on the front panel.

DC POWER ON LED: Located on the front panel, will be "ON” when inverter is powered up, and DC power is available.

LOW BATT / THERM BUZZER: Produces an audible alarm if DC input voltage falls to a level within 2% to 4% of the low limit of inverter, or, if there is an over temperature condition.

ON/OFF SWITCH: Located on front panel; turns the inverter on and off.

OVER VOLTAGE PROTECTION: When the battery voltage exceeds set limits, the inverter/charger will immediately and without warning shut off. This will require the user to cycle the on/off switch to turn the inverter back on. This fault can usually be attributed to a poor battery connection or faulty battery.

UNDER VOLTAGE PROTECTION: When battery voltage falls to within 5% of low line voltage, the LOW BAT/THERM buzzer will sound. If the condition continues without reducing load to the Inverter or adding charge to the battery, the inverter will shut off. When voltage rises to approximately 90% of nominal battery voltage the inverter will turn back on and the alarm condition will clear. The inverter can be manually reset by cycling the on/off switch. This will reset the protection circuit and turn the inverter on at any voltage above minimum voltage.

OVER TEMPERATURE PROTECTION: The inverter is also protected against overheating. It will provide its full rated output up to the temperature listed in the specification sheet. If it is subjected to higher ambient temperatures or air circulation is blocked, the inverter may overheat. If the LOWBATT/THERM buzzer sounds, immediate action is required or the inverter will shut down. Either reduce load, or provide more cooling in the immediate environment. If no action is taken, the inverter will likely shut down within 2 minutes. When the inverter shuts down, the alarm condition will persist and the cooling fan will continue to run. Since the inverter has eliminated its load, it will cool fairly quickly. It will automatically restart when it has cooled sufficiently, and the LOW BATT/THERM alarm will clear. “105° C internal temperature. Warning buzz 5° C before shut off”.

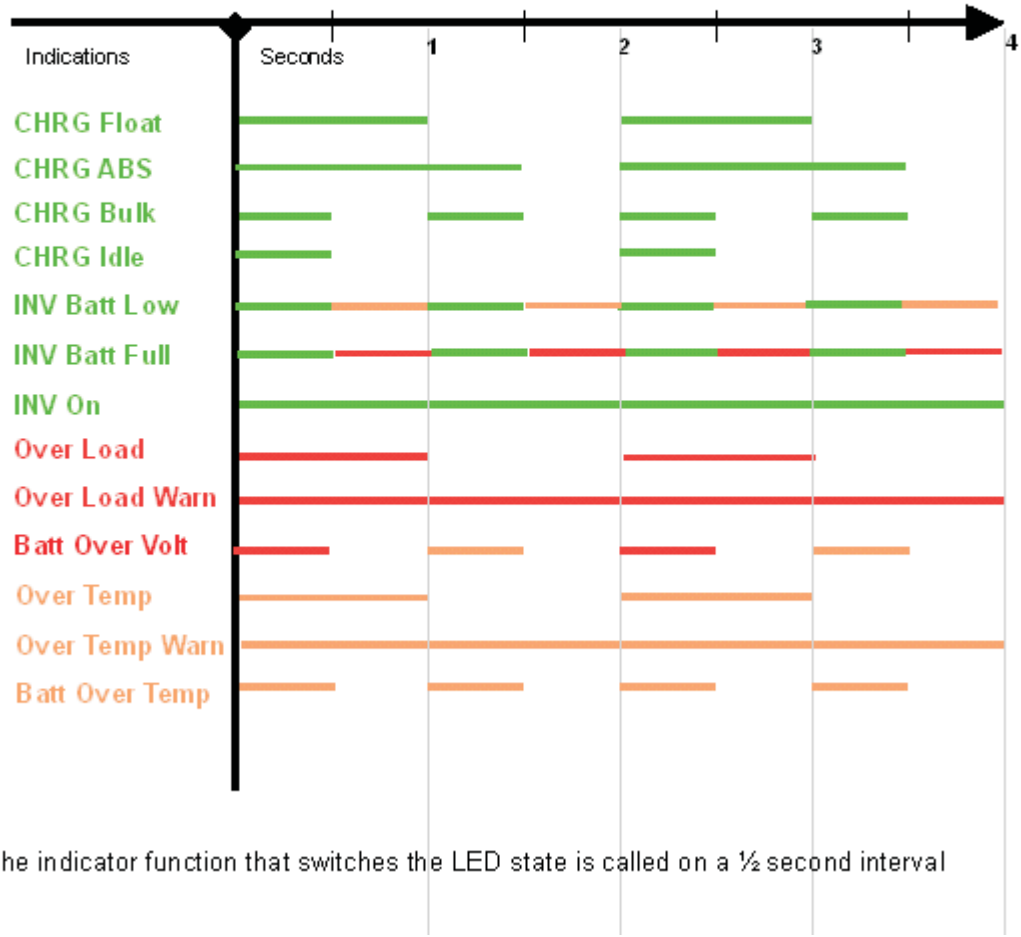
OVERPOWER, SHORT CIRCUIT PROTECTION: The inverter has three levels of overpower protection. The first limits peak instantaneous current. The second system limits absolute power coming from the module. Both of these circuits act to reduce output voltage as required, to limit current to a safe level. The overpower protection circuit will recover instantly if the overpower condition clears within 3-5 seconds. The third, is short circuit protection. If the over current condition is so severe that it causes output voltage to collapse for more than 5 seconds, the inverter will shut down and not automatically restart. The LED will flash red and the fan will be on. This requires the user to clear the short circuit safely, and guarantee that hazardous voltage will not come back on line until desired. To reset the inverter from this condition, cycle power switch “OFF” then “ON” again.

Exeltech 2kw inverters will provide peak current (45 A at 117VAC or 22A at 230VAC) or maximum surge (4000W) for 3 seconds when the inverter’s internal temperature is at or below 30° C. The output power is then reduced to 2000W (rated power) for 4 secs. If the inverter cannot restore a full sine wave due to overload, the LED will be red. If the overload condition does not clear in the 7 secs.

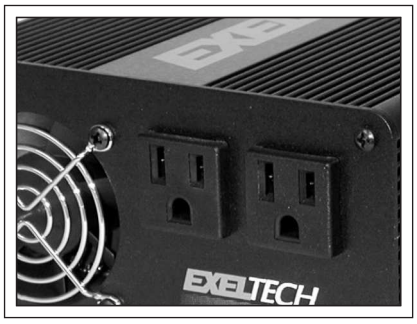
allowed, the inverter shuts off (flashing red indicator).

* LED will be red in overload and /or short circuit conditions. *

Inverter/Charger LED Indicator



* The indicator function that switches the LED state is called on a ½ second interval



Installation 3.0

CAUTION: It is essential to read and understand all Warnings, Cautions, and Notes before any connections are made to the unit or system. If further assistance is needed call (817) 595-4969 and ask for Customer Service.

WARNING: The inverter is designed to operate from a Battery. Performance cannot be guaranteed, and damage can result when a charger or power supply is used without a battery in the circuit.

WARNING: The AC neutral lead is bonded to chassis through the barrier terminal strip connector located on the back of unit. Chassis must be bonded to earth ground through the external ground connector located on the rear of the unit. (See Appendix C)

The Negative or Positive terminal of the battery (DC Source) must be bonded to earth ground. It's recommended that it be to the same earth ground used for AC ground.

CAUTION: Before any connections are made to the unit or system, be sure to disconnect the battery terminals. Always disconnect the grounded battery terminal first. When reconnecting, connect ungrounded terminal first, and grounded terminal last.
CAUTION: Polarity of leads is critical to avoid damage to the unit or system. Check batteries and battery cables for correct polarity and voltage.

CAUTION: Observe all National and Local Electric Codes when connecting AC Power Connections.

INSTALLATION (Location)

Mounting location is critical to performance and life span of the inverter. Heat and moisture are the two worst enemies of any electronic device. Therefore, when choosing a mounting location, consider the following requirements listed in order of importance:

1. Inverter must be sheltered from the elements. Select a clean, dry location.

2. Inverter requires adequate ventilation for cooling. With proper cooling, the inverter will operate efficiently and meet its published ratings. All models can be mounted in several positions. Best position, with fan down. Second best, horizontal. Third, vertical with fan up. Least preferred, upside down.

3. Inverter should be mounted as close to the battery as possible. Shorter wire has less resistance, which translates to increased efficiencies.

INSTALLATION (Wiring)

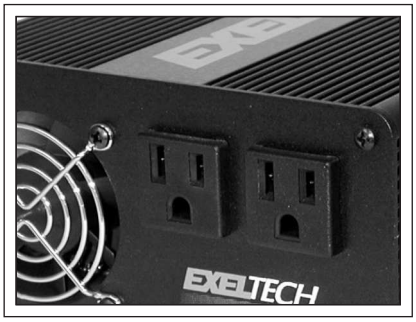
An in line fuse is recommended, to protect the battery and wiring to the inverter. This fuse should be located very close to the battery positive (+) terminal. To select appropriate size fuse, consult the "Rated and Peak Current" table in appendix "A".

1. Disconnect the **grounded** terminal of battery and make sure the charger and inverter are off.

2. Make DC input connections to the inverter as illustrated in “Appendix C”.

3. (Optional) Using 12-18 AWG wire, make Remote On/Off connection from the rear panel terminal labeled “REMOTE” to one pole of a small toggle switch. Then from the other pole of toggle switch, make a connection to battery negative (-).Make sure the toggle switch is in the off position.

4. Reconnect grounded terminal of the battery.



Operation 4.0

TURN ON INVERTER:

MCX/ICX: Turn inverter on using Toggle Switch on Front Panel, or the "REMOTE" switch if installed. LED next to the switch will illuminate, indicating the inverter is operational.

Note: If using "REMOTE" switch, the Front Panel Switch must be off. (If either switch is "on", the inverter will turn on. Both switches must be off for the inverter to turn off.)

TURN ON APPLIANCE/LOAD:

1. Check Input Power Requirements of the appliance. Make sure that it is less than Rated Output Power of the inverter. If more than one appliance will be run simultaneously, the sum of their Input Power Requirements must be less than Rated Output Power of the inverter.

2. If Appliance/Load has been hard wired to the barrier terminal strip as illustrated in Appendix "C", then turn appliance on. Otherwise, plug the appliance into the provided receptacle on Front Panel, then turn appliance on.

Note: It is recommend that the inverter be turned ON before the appliance/load.

APPENDIX *A*

Input Power Requirements:

MODEL	NORMAL VDC	MINIMUM VDC CUT-OFF / ALARM	MAXIMUM VDC	RATED CURRENT	PEAK CURRENT
MCX-ICX / 12VDC	13.8 VDC	10.5 VDC	15 VDC	222 A @ 13.8 Vdc	450 A @ 13.25 Vdc
MCX-ICX / 24VDC	27.6 VDC	21 VDC	30 VDC	171 A @ 27.6 Vdc	224 A @ 21 Vdc
MCX-ICX / 48VDC	55.2 VDC	42 VDC	60 VDC	85 A @ 55.2 Vdc	112 A @ 42 Vdc
MCX-ICX / 66VDC	75.9 VDC	57.8 VDC	82.5 VDC	62 A @ 75.9 Vdc	81 A @ 57.8 Vdc
MCX-ICX / 108VDC	124.2 VDC	95 VDC	135 VDC	38 A @ 124 Vdc	50 A @ 95 Vdc

Note: for the XP-2000, 12VDC input only! 4000W @ minimum battery voltage of 13.3VDC measured @ back plane lugs.

Recommended Input Wire Sizes (For Variable Distances from the Battery):

MODEL	LESS THAN 5'	LESS THAN 10'	LESS THAN 15'	LESS THAN 20'
MCX-ICX / 12VDC	2/0 AWG	3/0 AWG	250mcm AWG	250mcm AWG
MCX-ICX / 24VDC	4 AWG	0 AWG	2/0 AWG	3/0 AWG
MCX-ICX / 48VDC	8 AWG	6 AWG	4 AWG	0 AWG
MCX-ICX / 66VDC	12 AWG	8 AWG	6 AWG	4 AWG
MCX-ICX / 108VDC	16 AWG	12 AWG	12 AWG	10 AWG

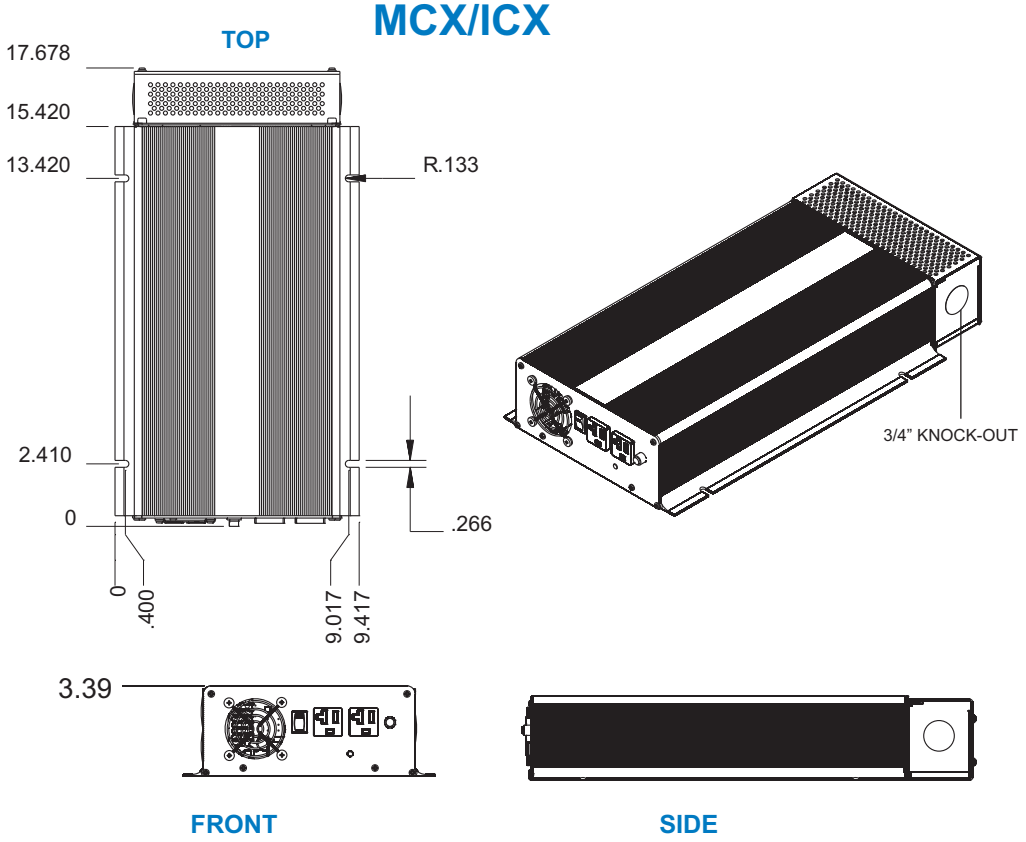
Note: *The table specifies standard wire sizes (not smaller than 18 AWG) that will provide less than a 2% voltage drop at Low-line Input voltage and Rated Output Power.*

CHARGER MODE - CHARGING CURRENT

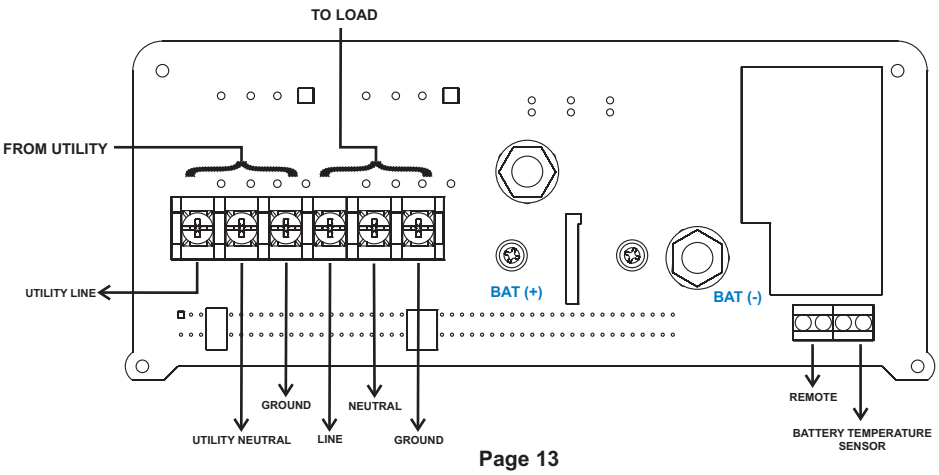
BATTERY VOLTAGE	I MAX	FLOAT VOLTAGE		
		MINIMUM	TYPICAL	MAXIMUM
12V	50A*	10.6V	13.4V	15.2V
24V	33.3A	21V	26.8V	30V
48V	16.6A	42V	53.6V	60V
66V	12.1A	57.8V	80.4V	82.5V
INPUT POWER FACTOR	> 0.98			

*Specifications subject to change.

MCX/ICX



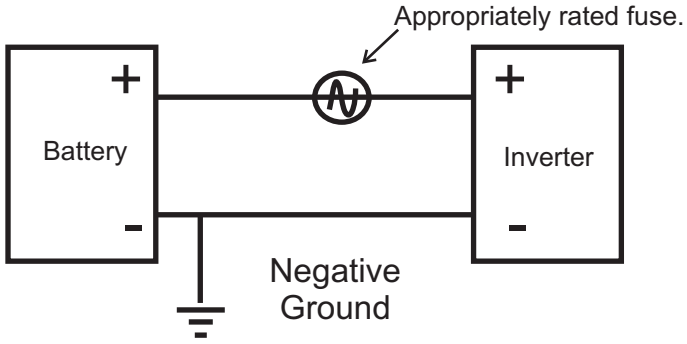
MCX/ICX Rear View with access cover removed (AC/DC Connections):

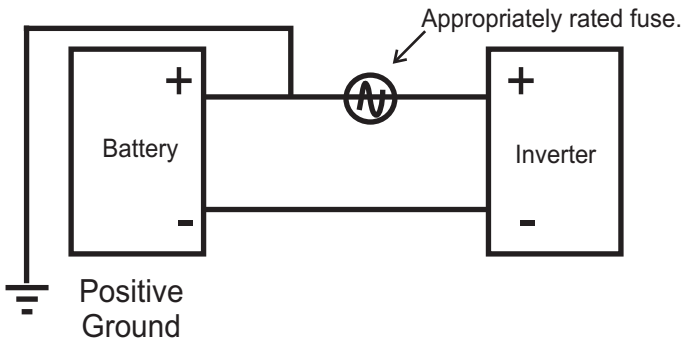


APPENDIX *C*

INSTALLATION

CAUTION: Be sure to disconnect all DC power to installation wiring. Be sure to disconnect batteries and chargers. Make all connections to the inverter **BEFORE** connecting DC leads to the battery.





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